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An Introduction to Lattice QCD: The Metropolis Algorithm and the Anharmonic Oscillator

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We provide a broad introduction to lattice QCD, which is a non-perturbative technique used to study strongly coupled QCD. Lattice QCD is a regularisation of QCD, where Euclidean space-time is discretised on a hypercubic lattice with spacing a , and the quark fields are placed on sites while gauge fields are placed on the links between these sites, then their interactions are simulated in thermal equilibrium. Lattice calculations require some basic input parameters, and in order to obtain physical results, one has to take the continuum and infinite volume limits. We employ the Markov Chain Monte Carlo (Metropolis) algorithm and present results of the following quantities for the anharmonic oscillator with various quartic couplings; acceptance rates, equilibration times, ground state probability densities compared to Schrodinger solutions, ground state energies and the energy differences of various excited states.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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